

# Translating organisational strategies to projects using Balanced Scorecard and AHP; A case study

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**Abstract:** Organisations need to link portfolio of projects to business strategy to optimise organisational benefits, and make sure their business will survive in competitive environments. This research aims to define the benefit of using mix approaches to integrate organisational strategies with their portfolio of projects for project-based companies. This paper illustrates how the use of mix approaches of Project Portfolio Management (PPM), Balanced Scorecard (BSC), and Analytic Hierarchy Process (AHP) can increase organisational performance and effectiveness in a real life case company. An effective PPM conceptual model is proposed to illustrate the overall roadmap from organisational strategy to projects. Further, a Portfolio Strategy Map is developed to visualise the cause and effect connection between portfolios and other strategic objectives using BSC approach. Finally, this study defines a Portfolio Selection Criteria procedure using AHP to evaluate and select the right projects. Four workshops of project experts were convened, and several case study projects were considered to facilitate the success of the portfolios thereby adding value to the company.

## 1. Introduction

Organisations experience rapid changes in the current economic environment and need to learn how to handle the existing uncertainties around their business activities (often undertaken through projects) in order to maintain their position in the world of constant disruption (Salmimaa, 2018). In these circumstances, not only financial but also non-financial factors that affect the portfolios of projects should be considered (Škrinjar et al., 2008). Organisations develop vision statement encapsulating their idea to define business strategy and showing where their future state (Garfein, 2008). They develop and launch a clear and understandable strategic plan to ensure that organisational strategies are highly aligned with the business objectives. They need to translate organisational strategies into portfolio of projects, which are undertaken to deliver products, services, or results to realise strategic outcomes. Project Portfolio Management (PPM) offers an opportunity to increase the chance of achieving organisational goals (Ward, 2015).

PPM has become an integral part of organisations to contribute to strategic management (Kaiser et al., 2015). PPM links projects to the organisational strategies and help organisations to make sure that resources are used efficiently (Fiala, 2014). In addition, PPM helps organisations to achieve targeted values by identifying initiatives and supporting organisations to select, prioritise, control, and terminate portfolio components based on strategic plan. Effective PPM requires a deep understanding of the linkage between strategy development and strategy implementation (PMI, 2015). This could help to implement strategies as it has been found that 66% of organisational strategy is never put into action (Johnson, 2004), and 95% of organisations' people do not understand strategies or even aware of them (Kaplan & Norton, 2005). However, implementing PPM processes individually cannot take organisations to their desired objectives and they need to use more methods to make better decisions to select more valued projects and to enhance stakeholders' satisfaction. As a result, this paper describes and use BSC and AHP to facilitate the translation of strategy to actionable, measurable objectives, decision-making. These tools and techniques, working together, can enable organisations to work on portfolios aligning with financial and non-financial strategies and evaluate their performance to estimate benefits. To meet business objectives, organisations need supports through financial and non-financial factors (Škrinjar et al., 2008). Kaplan Norton (1996) introduced the BSC as strategy performance management tool adding strategic non-financial perspectives to the traditional financial perspective in order to give organisations a more balanced view of organisational performance. BSC is a strategic planning and management system that advances organisational strategic plan from four perspectives: Financial, Customer, Internal Process, and Organisational Capacity (Kaplan, 2009). Organisations can utilise AHP to analyse complex decision in prioritising initiatives and allocating resources effectively. AHP enables decision makers to use valuable resources effectively in order to achieve maximised value (Gutiérrez & Magnusson, 2014). This paper addresses the following research question: "How can using PPM, BSC and AHP help organisations to translate strategy to actionable and measurable objectives and to gain more benefits?" To address this question this paper will proceed by firstly reviewing the literature on Project Portfolio Management (PPM), decision-making in PPM with Analytic Hierarchy Process

(AHP) approaches for translating Strategy to action and managing performance. Then the methodology and integrated framework and methods for strategy translation will be introduced followed by the case of the project-based company.

#### Methodology:

This paper develops understanding on translating strategy to actions and project portfolio management (PPM) and evaluates the reported literature with special attention on the Balanced Scorecard (BSC) and Analytic Hierarchy Process (AHP) methods. Then, this paper illustrates how organisations can use of mix approaches of PPM, BSC, and AHP. To transition the theoretical model to practice in a project-based company, this paper investigates the implementation of the model in the engineering company, dealing with EPC projects in oil, gas, petrochemical, mining industry, to examine the usability of the method. The case study involved analysing 16 projects. For collecting data, several meetings hold in workshops. Participant roles are Supportive Management Team, Strategic Planning Specialist, Senior Manager, Project Team, Project Portfolio Manager, Project Manager, and PMO Manger. In this paper, the qualitative feedback questioners from stakeholders reviewed to measure the impact of using the proposed method on organisation performance.

#### Interview:

Based on Yin's idea (Yin, 2009), interviews are one of the most important techniques to use as an evidence in case study processes. To obtain information, interviews must be used when any other way cannot be applicable (Darke et al., 1998). Interviews in this study developed based on semi-structured interview method. Semi-structured interviews which known as focused interviews (Dane, 2011), helps researchers to make a better communication with interviewees and understand their idea and thoughts (Daymon & Holloway, 2010). Therefore, researchers prepared questions and during interview meetings tried to gather more information by refocusing the questions if found something interesting. To collect data, researchers used several meetings in workshops and interviewed with all staff in different level of organisational chart who involved in portfolio, programme, and project management. To increase efficiency, in each workshop, at least two researcher participated, who have relevant experience and knowledge as well as data collecting skills. As a result, one of them was able to focus on the interview responses recording, and others can manage the interview activities (Kasunic, 2010). The results of the workshops analysed after implementation processes and will describe in the qualitative feedback section.

## 2. Literature Review

The literature review was carried out examining the current studies on Project Portfolio Management (PPM), Strategic Project Portfolio Management (SPPM), and the linkage between them to analyse the ways to convert thoughts into action thereby leading organisations to realise more benefits.

### 2.1. Project Portfolio Management (PPM)

A project portfolio is a set of projects and programmes, which run concurrently and pursue the organisational strategic objectives (Cooper et al., 1997). PPM involves more than just prioritisation and helps organisations to turn their intentions into reality by linking strategy and projects (Meskendahl, 2010). PPM empower project-oriented organisations to realise how projects and programmes can be identified, evaluated, prioritised, selected, categorised, balanced, managed and controlled as well as facilitates tracking performance against targets (Young & Conboy, 2013). Organisations launch portfolios of projects, and expect them to deliver products, services, and results and are careful to select projects with considering the availability of resources (Parker et al., 2015; Turner, 2009). Many (project-based) organisations favor moving from a single project to concurrent multi-projects to gain more benefits (Dietrich & Lehtonen, 2005; Elonen & Artto, 2003). Although small firms just manage their project individually, most of them struggle with complexities of multi-projects and to access project success and strategies they need to pick the best projects, balanced portfolios, and allocate sufficient resources to these projects (Cooper et al., 2002; Näsholm & Blomquist, 2015).

Without the right and an effective PPM framework in place, organisations could risk meeting their goals (Killen, 2014). PMI (2015) claims that organisations with have mature PPM can deliver their projects 35% more successfully and realise benefits. PPM procedures assist organisations to improve success and effectiveness by selecting the right projects creating the most return on investment (ROI) (Teller et al., 2012). Organisations are

implementing advanced PPM so as to undertake more of the right projects, utilise resources more efficiently, implement aligned projects effectiveness, enhance transparency and governance, and create more values (Aubry et al., 2007; Kendall & Rollins, 2003; KPMG, 2017) Which leads to maximising the value of the portfolio for organisations (Jonas et al., 2013).

PPM prioritise the strategic initiatives implemented through a portfolio of projects and it acts as a bridge between strategy formulation and its implementation (Meskendahl, 2010; Morris & Jamieson, 2005). The project portfolio prioritisation is a dynamic Multi-Criteria Decision-Making (MCDM) to select projects based on their potential benefits tied to key objectives (Yu et al., 2012). Organisations need to use customised tools and techniques for selecting project portfolios and doing associated activities of managing selected projects (Archer & Ghasemzadeh, 1999). There are several methodologies and frameworks in project portfolio management system, in which managers prioritise initiatives and allocate resources to achieve strategic benefits. However, AHP is one of the simplest and popular methods used for assessment, and decision making in portfolios with which the consistency of judgment can be checked (Danesh et al., 2015). Establishing a centralised unit, which may call Project Portfolio Management Office (PPMO) in organisations advances PPM to handle multi-projects, to develop competence, and to cater to the stockholders' demands. PPMO is a subset of Project Management Office (PMO) and established to make improvement in PPM to increase the number of successful projects (Jerbrant, 2014). PPMO is an emerging centralised organisational unit, supervising PPM, and can significantly enhance the achievement of organisational strategies by aligning project management with business strategy (Unger et al., 2012).

## **2.2. Strategic Project Portfolio Management (SPPM)**

Organisations set their vision to determine their strategy to view where they want to be and select their right projects and programmes to achieve objectives, business benefits, and customer benefits through them (Garfein, 2008). . To improve portfolio performance and advance value, organisations need to ensure that strategy defined and clarified and all staff, who are responsible, are aware of and engaged (Martinsuo & Killen, 2014): Furthermore, they define a performance measurement system to handle internal and external changes (Patanakul, 2015).

Using PPM assists organisations to promote the strategy of the organisation (Fiala, 2014). PPM is essential for the implementation of goals and strategies, thus contributing to strategic management (Kaiser et al., 2015). SPPM is a concept about the alignment of business strategic intent with the right portfolio of projects to make strategy real (Moore, 2010). It enables organisations to manage the complex portfolio of strategic options by combining strategic goals and project management to gives companies the best chance of having maximum value, and moving the organisation forward (Wessels, 2007). PPM enables decision makers to use valuable resources effectively in order to achieve maximised value (Drouin & Jugdev, 2014):

Having a centralised office is vital for successful strategy and strategic choices. An Office of Strategic Management (OSM) (Kaplan & Norton, 2005) is an organisational unit managing both strategy development and execution in an integrated way (Hassan, 2013) while a Project Management Office (PMO) provides support project and programme management in performance (Dai & Wells, 2004), and has an impact on organisational strategy implementation (Pmsolutions, 2013). However, integrating these units as a Strategic Management Unit (SMU) combines the advantages of PMO and OSM model, assuring enterprises to have a strategic focus and keeping projects aligned to gain better strategy execution results (Hassan, 2013). Effective results can be seen by implementing this unit: mapping strategy to projects, ensuring projects address strategic initiatives, even as these initiatives change over time, measuring portfolios' performance, giving a business the best returns (Dietrich & Lehtonen, 2005; Moore, 2010; Pmsolutions, 2012).

### **2.3. Decision-making in PPM with Analytic Hierarchy Process (AHP)**

Decision-making is the act of choosing between two or more options involving assessment and judgment (Lerner et al., 2015; Majumder, 2015). AHP developed by Saaty in the 1970s as a Multi-Criteria Decision Making (MCDM) tool for analysing complex decision (Saaty, 1980). AHP is a mathematical model available to decision makers, which helps them to decompose their decision problem into a hierarchy sub-problems in order to make pairwise comparisons and define priorities amongst the elements (Majumder, 2015). AHP can be applied in these situations: Ranking, Prioritisation, Choice, Resource allocation, Decision Making, Forecasting, Quality management, Conflict resolution (Büyüközkan et al., 2011; Vaidya & Kumar, 2006).

Organisations cannot handle all the projects at once, so they need to decide and select one or several out of a set of possible initiatives. Furthermore, project uncertainty is another crucial issue effect on selecting portfolio of projects (Ghapanchi et al., 2012). PPM is a dynamic decision process in which priorities established for each project in a portfolio (Pajares & López, 2014). Facilitation of decision-making in a PPM through an AHP method might provide organisations with a system to cope with various decision situations and choose the best values during decision processes (Danesh et al., 2015; Vargas, 2010). The difficulty of the implementation of PPM stems from the uncertainties present in the turbulent environments, scarce resources, political changes, rapid technological advances, and increasing competitive forces (Petit, 2012; Wheelen & Hunger, 2008).

Project portfolio managers have an especially important role to play in specifying criteria required in ranking projects and providing judgments about the ranking of each project based on each criterion to select the most suitable that help to maintain strategic alignment (Jonas, 2010). Although no perfect model exists to determine the right criteria to prioritise and select projects, the following criteria are suggested be used in the prioritisation of projects: Financial, Strategic, Risks (Threats), Urgency, Stakeholder commitment, Technical Knowledge, Social Responsibilities (Vargas, 2010).

### **2.4. Approaches for translating strategy to action and managing performance**

What top management call as strategic success factors, must be linked to activity level. Making decisions on the best way to manage strategy can be a difficult task in complex environments (Eisenhardt, 1989; Martinsuo et al., 2014). Organisations would prefer to select the right methodology and tools in order to translate strategy and objective into executable action (Kekic, 2007). Choosing methodology and tools indeed depends on the level of organisational complexity, programmes and projects interdependencies, and managerial approaches (Martinsuo & Killen, 2014) Turning strategic goals into an executable project plan should also be understood and carried out by capable teams can play a key role in achieving competitive advantage (Mankins & Steele, 2005). Strategic management generally starts with a strategic plan. However, not all projects are align with planned goals, which can be counterproductive for organisations. If organisations cannot link a project to their strategy, they should ask whether that project must be done. Thus, selecting the best methodology is important for organisations to link their projects to the organisational strategy to keep their scope realistic and it can bring organisations closer to achieve their key goals and Key Performance Indexes (KPIs) (Niebecker et al., 2010). Many organisations are trying to find a way to align their projects to strategy and bring them into the strategy execution. The result has been the rise of performance measurement frameworks that can help leaders assure that organisational strategy turns into action (Striteska & Spickova, 2012). There is no cut and dried answer to the question of which framework is better than others. Many different supporting management systems can be used based on the structure and nature of the organisation. Most of them are more complementary to each other rather than compete. This paper reviews Financial Ratio Analysis (FRA), Capability-Based Planning (CBP), Results-Based Management (RBM), and BSC.

FRA framework is based on the examination of financial statements to make better economic decisions. It is used both as a planning and as a control tool. FRA helps organisations to evaluate their performance and define the strengths and weaknesses aspect of organisations (Alrafadi & Md-Yusuf, 2011). Although FRA is used as a planning and controlling tool due to legislative requirements in organisations, it typically generates a financial performance report without covering intangible assets (Alrafadi & Md-Yusuf, 2011). Since 1960s researchers have observed the limitation of financial measures, Dearden (1969) argues against ROI management control devices as non-financial measures can add more value (Epstein & Manzoni, 2006).

CBP focuses on the planning, engineering, and delivery of strategic business capabilities to the enterprise. In order to respond to the dynamic environment, CBP can be used to carry out strategic management to employ

resources to achieve some goals (Jacob et al., 2012). This framework focuses on capabilities and drivers required by organisations to execute their business strategies (Scott, 2014). By using this dynamic capability, organisations can concentrate on learning and growing processes, resources and competencies (Jarzabkowski & Wilson, 2006).

“RBM is a management strategy by which all actors, contributing directly or indirectly to achieving a set of results, ensure that their processes, products, and services contribute to the achievement of desired results (outputs, outcomes, and higher level goals or impact)” (UNDP, 2007). It uses information and evidence on actual results to achieve outputs, outcomes, and improve performance. RBM used for planning (to set the vision and define the results), implementing and monitoring (to guarantee results are being achieved), and evaluating projects and programmes (to provide performance reports) (Örtengren, 2016). Continual feedback and adjustment processes help organisations to respond rapidly to changing environments, which within they operate (UNDP, 2007).

BSC, developed by Kaplan Norton (1996), is a comprehensive strategic perspective performance measurement system, which is translating the strategy of business to strategic objectives, measures, targets and preliminary and clear practical steps. It is one of the most successful, performance management concepts in recent years. It combines financial and non-financial measures for organisational performance evaluation. It is a tool for strategic management, which is used to enhance management of intangible assets, balance performance measurement and management, and facilitate translating strategy into action (Kaplan, 2005; Marr, 2005; Marr & Schiuma, 2003). Significant benefits have been realised from using a Scorecard system and is reported as one of the most influential business thoughts (Lawson et al., 2003).

BSC provides a framework for performance measurement and evaluation by four different perspectives; financial (surviving, succeeding, and prospering financial goals), customer (delivering value to customers), internal business process (promoting process and competencies), and learning and growth (expanding capabilities and innovation to face future challenges) (Kaplan, 2005; Singh et al., 2018). BSC helps organisations to find knowledge, skills, and infrastructures that will be needed (the learning and growth) to innovate and develop the appropriate strategic capabilities (the internal processes) which make value to the targeted market (the customers) that will lead to advanced value (the financials) (Kaplan & Norton, 2000). According to 2GC (2017) Balanced Scorecard usage survey, 74% (37% in first survey 2008) of companies use BSC for strategic management and 77% of companies reported BSC as extremely and very helpful. This trend shows that the role of the BSC has evolved more from a simple reporting to strategic management.

These methods can help organisations to have a better performance of their strategy implementation.

Based on BSC approach, a strategy map should be used to guide corporates into future places and demonstrate the relationships among strategies in different dimensions (Kaplan & Norton, 2004; Quezada et al., 2009). Strategy map, which is also known as strategic communication and linking plan, plots four perspectives of the BSC by using cause and effect thinking (Niebecker et al., 2008) and inspire effective communication through all phases of the business (Atkinson, 2006; Scholey, 2005), See Fig 4 as an example. Strategy map can describe objectives, aligning with vision and mission, translate organisations' initiatives and resources (intangible assets) into tangible and measurable outcomes recognised by top management all employees (Alexander, 1985; Kaplan & Norton, 2004, 2007; Lueg & Julner, 2014). It uses as a compass and helps firms illustrating how members' duties are involved in realising the organisations' objectives.

### **3. Overall view of strategy translation using Integrated Framework and method**

Based on the literature review, this paper proposes a Project Portfolio Conceptual Model (Figure 1) and the processes (Figure 2) required implementing the proposed conceptual model. The Project Portfolio Conceptual Model illustrates how combining Balanced Scorecard (BSC) and Analytic Hierarchy Process (AHP) helps organisations in translating their strategic plans into action through selecting the right portfolio of projects. This model will be applied to a project-based company as a case study in Section 4.

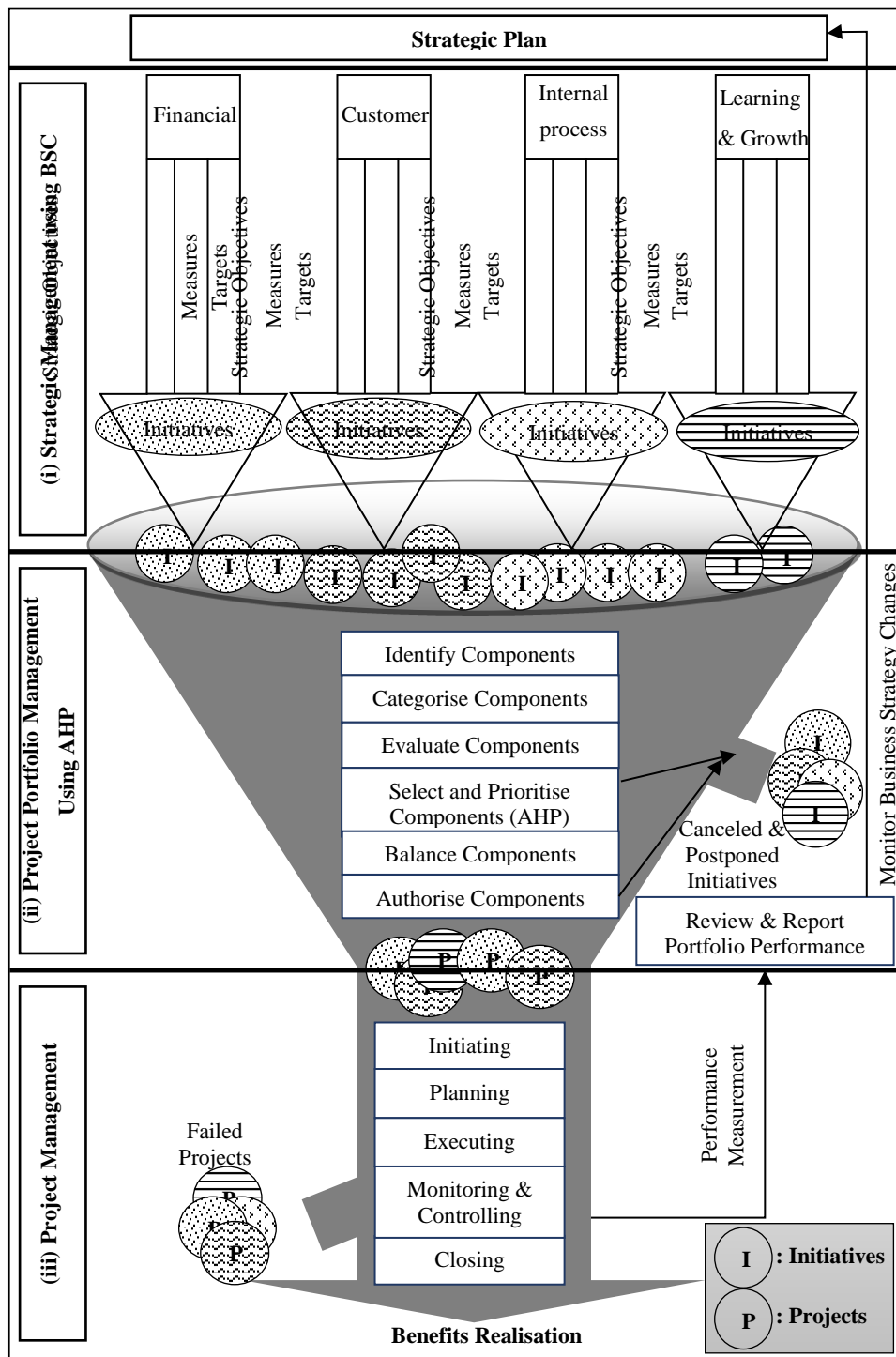
Figure 1 presents the overall view of the PPM conceptual model and shows the steps from the strategic plan to benefit realisation. Organisations are expected to obtain benefit realisation and access to greater productivity by

following these three steps; (i) Strategic Management using BSC, (ii) Project Portfolio Management using AHP, and (iii) Project Management.

In the step (i) (Strategic Management), strategic plan is established, based on vision (direction of organisations over the long term), mission (conceptualisation of organisation's future), and values (guiding principles and basic beliefs). The aim of the strategic plan is to keep teams on the same page, to determine where to spend resources, and to avoid wasting money unbeneficial activities. Then by using BSC, strategic plan advanced from four perspectives: Financial, Customer, Internal Process, and Learning and Growth. This balanced view of financial and non-financial objectives help to organisations seeking improvement in defining benefits. BSC translates strategic plan to objectives, measures (i.e. KPIs, which track strategic performance), targets (i.e. the desired level of performance), and initiatives (i.e. projects that help organisations to reach their targets). Organisations can use BSC to develop a Portfolio Strategy Map, to develop the relationship between organisational strategies and projects and the balanced view of objectives.

In the step (ii) (Project Portfolio Management), the list of initiatives, which comes from step (i) (Strategic Management), is prioritised and selected through Analytic Hierarchy Process (AHP) method. PPM is a process to identify, categorise, evaluate, select and prioritise, balance, and authorise components. Initiatives may cancel or defer based on the prioritisation. AHP is one of the decision-making method to support organisations to develop Portfolio Selection Criteria and prioritise and selecting the right portfolio of projects.

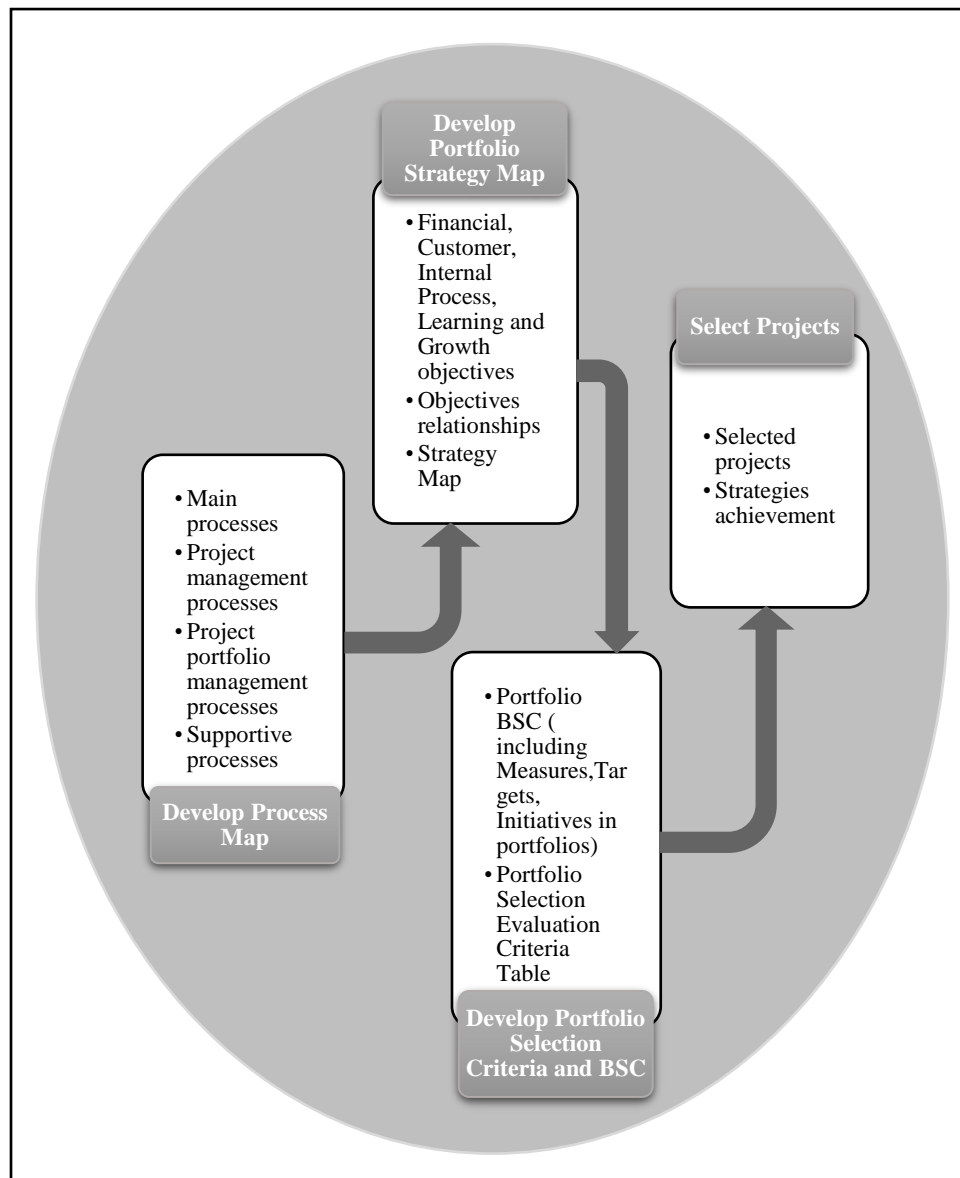
Finally, in the step (iii) (Project Management), projects are launched to project managers to fulfil the project objectives through four phases: initiating, planning, executing, monitoring and controlling, and closing. Throughout monitoring and controlling phase, project performance is measured based on measures and targets and portfolio performance reports are provided for project portfolio managers. After finalising projects, project benefits be realised and sustained.



**Figure 1: Project Portfolio Conceptual Model**

To make the Project Portfolio Conceptual Model (Figure 1) practical, this paper outlines the executing processes (Figure 2). The model consists of four processes. In each process, the related experts and managers (e.g., Senior Managers, Strategic Planning Team, Project Portfolio Managers, Project Team, and Supportive Management Team) need to be engaged to get their advisory as key stakeholders. Facilitators manage potential conflicts

between all parties. Besides, the facilitators need to be conscious of scope creep and capture the right amount of information.



**Figure 2: The conceptual model processes**

The purpose of Organisational Process Map is to identify and analyse the current organisational processes (project management, project portfolio management, and supportive processes). Organisational Process Map illustrates what organisations really does and where they are. Then, by formulating a Portfolio Strategy Map inspiring BSC, organisations can provide the balanced view of objectives with four perspectives (Financial, Customer, Internal Process, and Learning and Growth). A Portfolio Strategy Map develop based on organisation’s vision, mission, values, and customer requirements. To develop a Portfolio Strategy Map, organisations needs to: (i) Identify, analyse, and register the financial and customer objectives to manage portfolios aligning with the organisational strategies; (ii) Define initiatives as portfolios in the internal process perspective with the purpose of achieving the financial and customer objectives; (iii) Identify all organisational facilities and capabilities required to implement and support portfolios. (iv) Identify relationships between objectives in each perspective. To have a balanced view of objectives and measure progresses toward achieving strategic objectives, organisations can use Portfolio BSC. Measures need to be defined to help organisations keeping pulse on their strategic performance in four perspectives: (Financial, Customer, Internal Process, and Organisational Capacity). Each measure has its specific target value. Key Performance Indexes (KPIs) require to be defined for portfolios



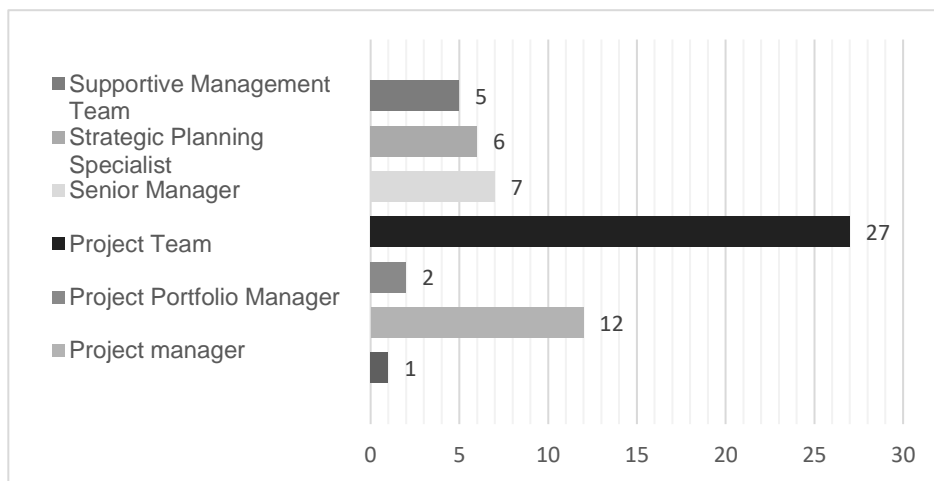
to monitor and control the portfolio performance. KPIs should be traced to define whether they achieve the strategic objectives. Potential initiatives aligning with portfolio strategic objectives are developed in portfolio perspective in Portfolio BSC. Organisations need develop Portfolio Selection Criteria to facilitate the projects selection process. AHP technique can be used to set priorities. Then, projects evaluated, selected, and authorised by using Portfolio Selection Criteria and AHP. After selecting the right portfolios, projects are launched to project managers. Projects are done in five process group; Initiating, Planning, Controlling, Monitoring, and Closing. Portfolio performances need to be measured periodically to keep them align with the strategic objectives and manage changes if needed.

#### **4. Case Study and Results**

This research developed by means of a case study to transition the theoretical model to practice in a project-based company. The study investigates the implementation of the model in the engineering company, dealing with EPC projects in oil, gas, petrochemical, mining industry, to examine the usability of the method. The case study involved analysing 16 projects in four processes (Table 2). Participants' roles presented in Figure 3.

**Table 2: Processes Timetable**

Process	Number of Meetings	Duration of Meetings (hour)	Number of participants	Man-hour
<b>Develop Process Map</b>	5	4 hr	7	140
<b>Develop Portfolio Strategy Map</b>	12	5 hr	13	780
<b>Develop Portfolio Selection Criteria and BSC</b>	4	3 hr	8	96
<b>Select Projects</b>	5	5 hr	10	250



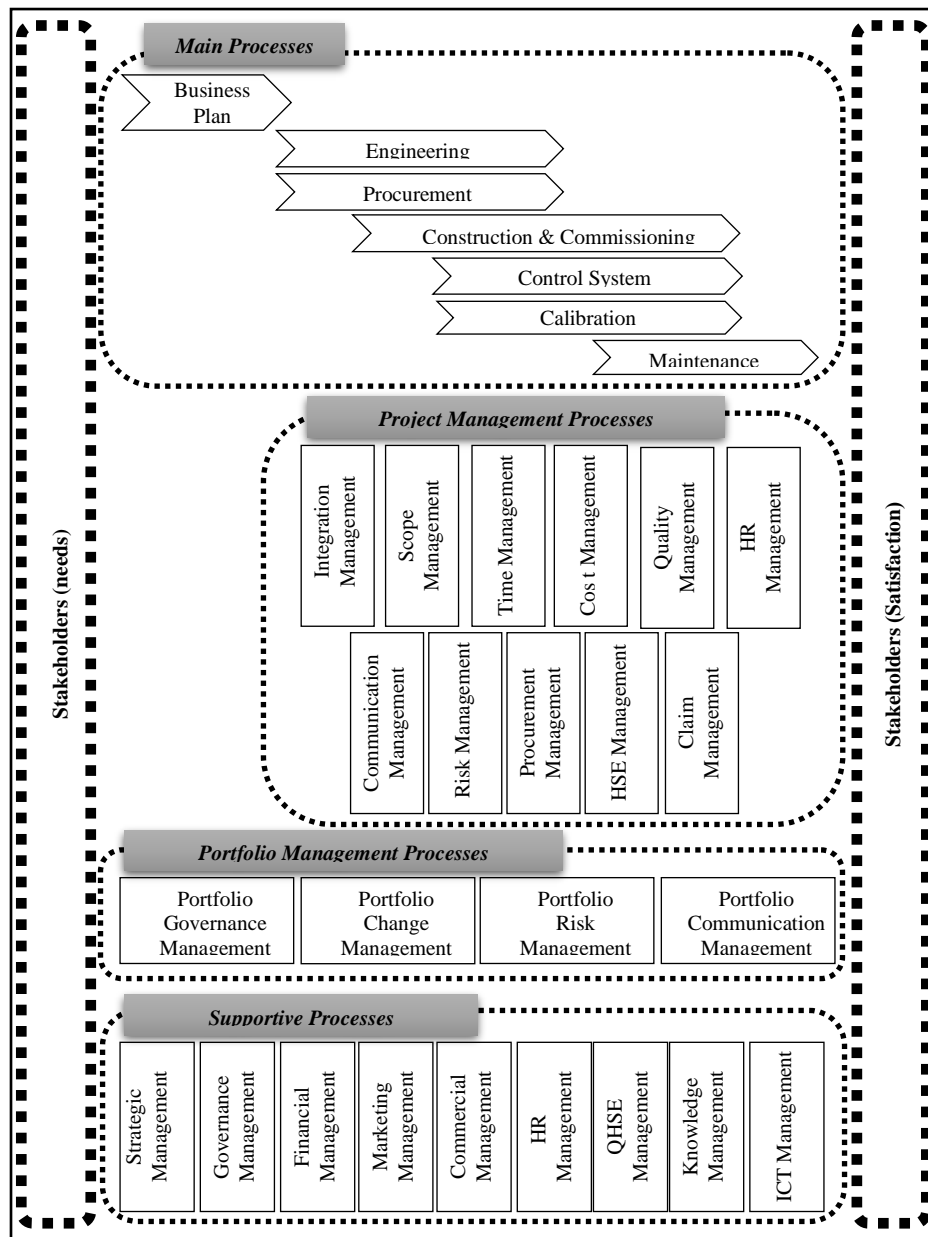
**Figure 3: Participants Positions**

The name of the company and experts involved are disguised in this paper for confidential purposes. This study conducted in a company to use the proposed models and processes in practice during this study, a tight connection between Balanced Scorecard and PPM was designed to provide a balanced view of financial and Non-financial strategy aspects. In this stage, the difficulty was to transition from theory to practice, because they had no process map, and strategy map and they had never participated in such workshops as a team works to establish their processes and outcomes. Four workshops implemented in this case study in and the proposed methods were used to establish the outcomes.

#### **4.1. Developing Organisational Process Map**

An Organisational Process Map shows what do companies really do and where they are. This map provides a cross-functional picture of organisational processes and shows how stakeholders' needs transfer to stakeholders' satisfaction. All processes needed to list in four different groups; Main Processes, Project Management Processes, Project Portfolio Management Processes, Supportive Processes. In this workshop, senior managers, supportive management team, project portfolio managers, project managers, project team, PMO manager attended in several meetings. The principles of developing organisational process map were introduced to participate. Then, the organisational process map was plotted (Figure 4). Providing this overall view of processes resulted in a work environment where all team members of the company were aware of their company's activities and helped them

to realise their responsibilities. Figure 4 shows the process map for the case study, which identifies the capabilities and portfolio strategic objectives in internal process layers of portfolio strategy map in the next phase.

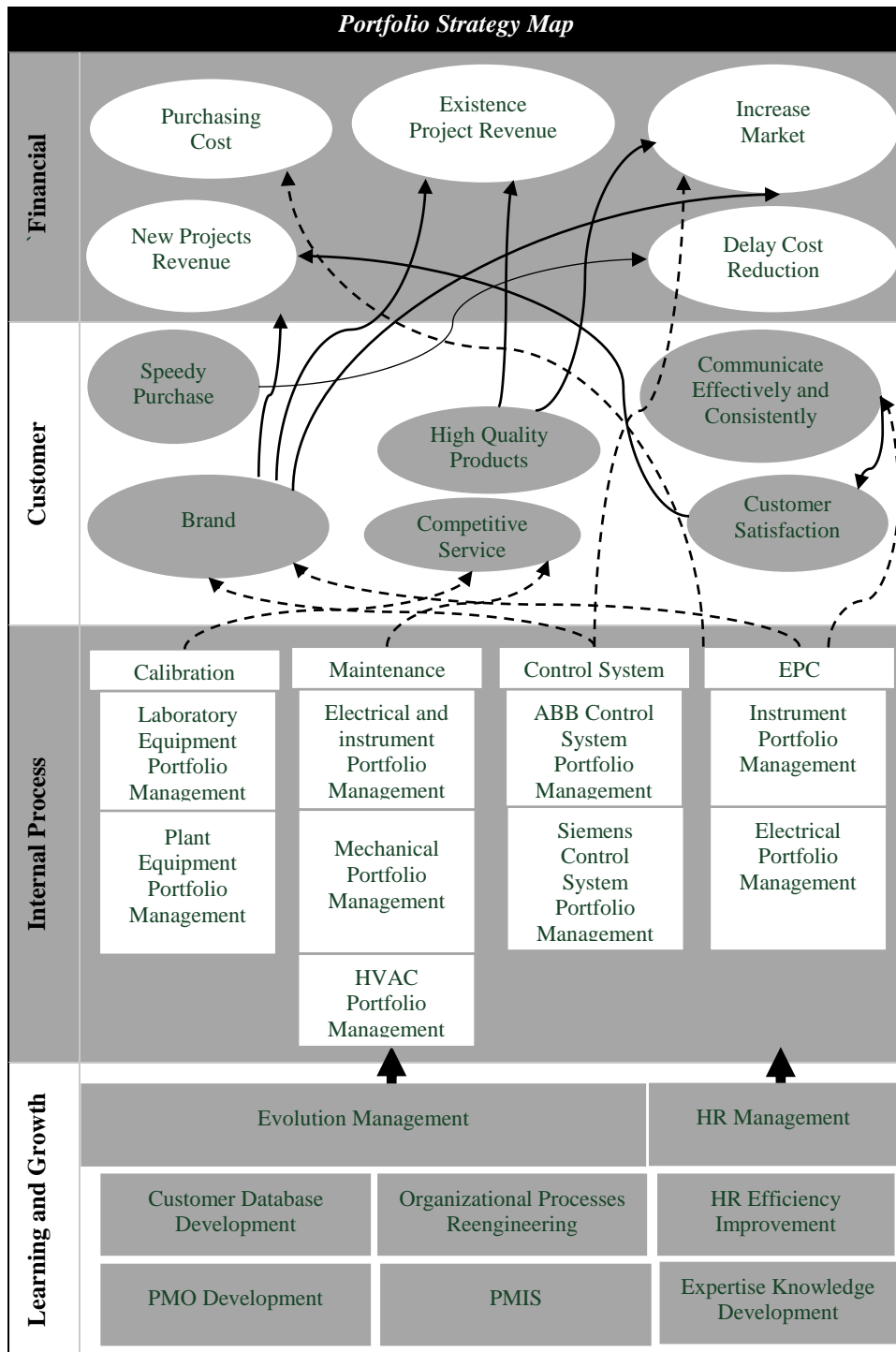


**Figure 4: Organisational Process Map**

#### 4.2. Developing a Portfolio Strategy Map

Organisations have a set of objectives, which need to be achieved through the business strategy. To get proper Return on Investment (ROI) and maximise benefit realisation organisations need to align their portfolios to

organisational objectives. In this workshop, this case study used a Portfolio Strategy Map inspiring BSC, to provide the balanced view of the organisational objectives with four perspectives (Financial, Customer, Internal Process, and Learning and Growth). By holding several meetings, this case study built a portfolio strategy map (Figure 5) and aligned the portfolios with other organisational objectives. . Senior Managers, project portfolio manager, project managers, project team, strategic planning specialists, and PMO manager were participated to establish the portfolio strategy map. This case study developed a portfolio strategy map illustrating how strategies could be adopted at financial obligations (shown in the first perspective) and customer requirements (shown in the second perspective) though portfolios (shown in the third perspective). In the bottom perspective, this case study developed learning and growth driving portfolios, which impacts stockholder satisfaction. This Portfolio strategy Map illustrates the cause and effect connection between financial, customer, portfolios, and learning and growth perspectives.



**Figure 5: Portfolio Strategy Map**

**4.3. Developing Portfolio Selection Criteria and BSC**

Portfolio BSC is a helpful tool to develop and measure progress toward achieving strategic objectives. In this workshop, all objectives were presented from four perspectives in Table 3: Financial, Customer, Internal Process, Learning and Growth. Then this case study established measures and targets to measure and manage the company performance against those strategic objectives. Initiatives were defined as portfolios and improvement projects dedicated to the learning and growth group. Furthermore, the Portfolio Selection Criteria was defined by using the

brainstorming method, questionnaires, and AHP. The reason to do analysis is to determine the Portfolio Selection Criteria Evaluation table to define the opportunities leading to have more effective and productive portfolios in order to achieve the strategic plan. This workshop was held with senior managers, project portfolio managers, project managers, project team, strategic planning specialists, and PMO manager to finalise the measures and targets.

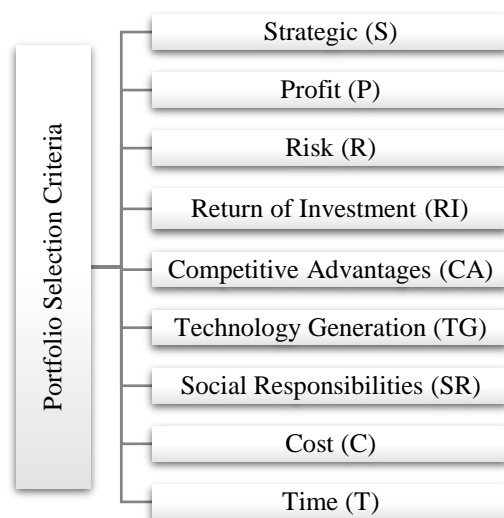
**Table 3: Portfolio Balanced Scorecard**

		Balances Scorecard		
Perspective	Objective	Measure	Target	Initiative
<b>Financial</b>	Purchasing Cost Reduction	Cost Reduction	15%	
	New Projects Revenue	Revenue Growth	25%	
	Existence Project Revenue	Revenue Achievement	100%	
	Delay Cost Reduction	Cost Reduction	20%	
	Increase Market Development Revenue	Revenue Growth	15%	
<b>Customer</b>	Speedy Purchase	Customer satisfaction Growth	5%	
	Brand	Vendor List Register	5%	
	High Quality Products	Customer satisfaction Growth	5%	
	Communicate Effectively and Consistently	Customer satisfaction Growth	8%	
	Competitive Service	Customer Amount	10%	
	Customer Satisfaction	Customer satisfaction Growth	5%	
<b>Internal Process</b>	EPC	Efficiency	>80%	Instrument PM
		Delay	<20%	
		Procurement Cost Deviation	<5%	Electrical PM
		Progress Achievement	100%	
	Control System	Efficiency	>80%	Siemens CS PM
		Delay	<5%	ABB CS PM
		Progress Achievement	100%	
	Maintenance	Safety	100%	Electrical and Instrument
		Efficiency	>90%	Maintenance PM
		Delay	<10%	HVAC Maintenance PM
		Progress Achievement	100%	Mechanical Maintenance PM
	Calibration	Rejected Test	<2%	Laboratory Equipment Calibration PM
		Progress Achievement	100%	Plant Equipment Calibration PM
	<b>Learning and Growth</b>	Evolution Management	Process Productivity Growth	10%
Organisational Productivity Growth			5%	Organisational Processes Reengineering PMIS
HR Management		HR Productivity	5%	Expertise Knowledge Development

		Balances Scorecard		
Perspective	Objective	Measure	Target	Initiative
				HR Efficiency Improvement

#### 4.4. Selecting Projects

One of the main challenges that organisations face in complex environments is choosing the rightest projects in a way that they align with strategy. AHP is one of the mathematical models to make a decision. In order to prioritise portfolio criteria to support selecting the best projects, AHP method utilised. In this workshop at first, a Portfolio Selection Evaluation Criteria table with AHP defined (Figure 6, Table 4-5).



**Figure 6: Hierarchy of Criteria**

The pairwise comparison matrix for criteria (n=9) was prepared using the intensity scales submitted in Table 4.

**Table 4: A Sample Pairwise Comparison Matrix**

Criteria	S	P	R	RI	CA	TG	SR	C	T
S	1	1/3	1/5	1/4	1/3	1/3	1/3	1/5	1/3
P	3	1	1/2	1/3	1/2	1/2	1/2	1/4	1/5
RI	5	2	1	1	1/3	1	1/3	1/5	1/5
RO	4	3	1	1	1/3	1	1/3	1/5	1/3

CA	3	2	3	3	1	1	1/3	1/3	1/3
TG	3	2	1	1	1	1	1/2	1/3	1/5
SR	5	2	3	3	3	2	1	1/5	1/3
C	5	4	5	5	3	3	5	1	1/3
T	3	5	5	3	3	5	3	3	1
Total	30.000	21.333	19.700	17.583	12.500	14.833	11.333	5.717	3.267

The priority or weights of each criterion has been calculated and presented in Table 5 as Criteria weights.

**Table 5: Criteria Weights**

Criteria	S	P	R	RI	CA	TG	SR	C	T	Weight Vector	%	Consistency Measure
S	0.033	0.016	0.010	0.014	0.027	0.022	0.029	0.035	0.102	0.032	3.21	12.376
P	0.100	0.047	0.025	0.019	0.040	0.034	0.044	0.044	0.061	0.046	4.60	8.966
RI	0.167	0.094	0.051	0.057	0.027	0.067	0.029	0.035	0.061	0.065	6.53	7.719
RO	0.133	0.141	0.051	0.057	0.027	0.067	0.029	0.035	0.102	0.071	7.13	8.306
CA	0.100	0.094	0.152	0.171	0.080	0.067	0.029	0.058	0.102	0.095	9.49	10.069
TG	0.100	0.094	0.051	0.057	0.080	0.067	0.044	0.058	0.061	0.068	6.81	9.491
SR	0.100	0.094	0.152	0.171	0.240	0.135	0.088	0.035	0.102	0.124	12.41	10.638
C	0.167	0.188	0.254	0.284	0.240	0.202	0.441	0.175	0.102	0.228	22.81	11.377
T	0.100	0.234	0.254	0.171	0.240	0.337	0.265	0.525	0.306	0.270	27.02	12.986
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	<b>100</b>	$\lambda_{max} =$ 10.24

The consistency ratio is known as CR where  $CR = CI/RI$ . The CR has been shown by Saaty (Saaty, 1990) that a consistency ratio of 0.10 or less is acceptable. Otherwise, the consistency ratio is considered unreliable and it is necessary to review the findings to detect the reason for the inconsistency and recalculate it. The CR value in a comparison matrix is formulated as below:

$$CR = (\lambda_{max} - N) / ((N-1)RI)$$



In order to calculate the CR, it is needed to find the value of  $\lambda_{\max}$  indicated in Table 3. Considering  $\lambda_{\max} = 10.214$ , and  $CR = 0.093 (< 0.1)$ , consistency is acceptable and the value is sufficient.

Then prioritisation and selection of projects in portfolios were done to maximise value and fulfil organisational strategies. Projects with higher benefits had a higher priority (Table 6). Project portfolio managers and PMO manager attended these meetings.

**Table 6. Prioritising projects**

	Portfolio	Project	Priority
<b>EPC</b>	Instrument PM	Project #1	3
		Project #2	2
		Project #3	6
	Electrical PM	Project #4	10
<b>Control System</b>	Siemens CS PM	Project #5	7
		Project #6	1
	ABB CS PM	Project #7	11
<b>Maintenance</b>	Electrical and Instrument Maintenance PM	Project #8	12
	HVAC Maintenance PM	Project #9	4
	Mechanical Maintenance PM	Project #10	8
<b>Calibration</b>	Laboratory Equipment Calibration PM	Project #11	14
		Project #12	5
		Project #13	16
		Project #14	13
	Plant Equipment Calibration PM	Project #15	9
		Project #16	15

#### **4.5. Qualitative feedback**

Balanced satisfaction of all internal and external stakeholders while achieving organisational strategy can be realised through selecting right projects with using effective tools. The final building blocks of this case study were collecting qualitative feedback data from stakeholders using questionnaires and interview to measure the impact of using the proposed method on organisation performance. Although achieving some strategic objectives are a long term we tried to measure the impact of using the proposed method in a project-based organisation. Ten 15-minute face to face interviews conducted with 10 internal stakeholders and realised that projects and portfolios which were selected by proposed method bring more benefit for company than which were not involved in the AHP selection process. Furthermore, developing initiative portfolios as an internal process in Balanced Scorecard (BSC) improved performance and enhanced organisational effectiveness. In addition, questioners applied to customer satisfaction measurements, and examined the impact of customer expectations and needs on the company's strategies for improving satisfaction. The results showed that the customers' satisfaction was enhanced by almost 20% in projects, which used the proposed method and customers were more eager to work with the company.

## 5. Conclusion and Future Research

The purpose of this paper is to show how mix approaches of Project Portfolio Management (PPM), Balanced Scorecard (BSC), and Analytic Hierarchy Process (AHP) can increase organisational performance and effectiveness in a real life case company. By using mix approaches (PPM, BSC, AHP) stakeholders can have a better understanding of objectives and realise how objectives need to measure. Furthermore, this study shows how Developing Organisational Process Map, Developing Portfolio Strategy Map, Developing Portfolio Selection Criteria and BSC, and Selecting Projects processes can be used in organisations to translate strategies to actions and to enhance organisational performance. The Portfolio Strategy Map inspiring BSC facilitate the understanding of financial and Non- financial objectives. Organisations need to define the relationship between objectives in four perspectives: financial, customer, portfolios, and learning and growth. A Portfolio strategy Map shows the relation between portfolios and objectives, and illustrates how capabilities drive portfolios to deliver tangible and intangible benefits. By using Portfolio Balance Scorecard measurement and evaluation can be define in four different perspectives. In addition, selecting projects by using an effective decision-making method such as AHP could increase the chance of successful benefit realisation and strategy implementation. AHP has been a direct result of improving criteria selection and making project portfolios successful. The implementation of this study was successful and indeed helped the project portfolio management system doing its responsibility in a more effective way.

Future research may consider other alternative tools and techniques to use instead of BSC and compare their advantages and drawbacks. In addition, AHP used as a decision-making tool. Future studies can explore different weighing and prioritising system. Moreover, future research can carry out to develop different perspectives in BSC. Finally, since the conceptual model and innovated tools and techniques developed in this study was implemented in the project-based company dealing with EPC projects in oil, gas, petrochemical, mining industry, future empirical research should analyse using BSC in PPM in other industries in practice.

## References

- 2GC. (2017). Balanced Scorecard Usage Survey 2017. Retrieved from <https://2gc.eu/resources/survey-reports/2017-survey>
- Alexander, L. D. (1985). Successfully implementing strategic decisions. *Long Range Planning*, 18(3), 91-97. doi:10.1016/0024-6301(85)90161-X
- Alrafadi, K. M. S., & Md-Yusuf, M. (2011). Comparison between Financial Ratios Analysis and Balanced Scorecard. *American Journal of Economics and Business Administration*, 3(4), 618-622. doi:10.3844/ajebasp.2011.618.622
- Archer, N. P., & Ghasemzadeh, F. (1999). An integrated framework for project portfolio selection. *International Journal of Project Management*, 17(4), 207-216. doi:10.1016/S0263-7863(98)00032-5
- Atkinson, H. (2006). Strategy implementation: a role for the balanced scorecard? *Management Decision*, 44(10), 1441-1460. doi:10.1108/00251740610715740
- Aubry, M., Hobbs, B., & Thuillier, D. (2007). A new framework for understanding organisational project management through the PMO. *International Journal of Project Management*, 25(4), 328-336. doi:10.1016/J.IJPROMAN.2007.01.004
- Büyüközkan, G., Çifçi, G., & Güleriyüz, S. (2011). Strategic analysis of healthcare service quality using fuzzy AHP methodology. *Expert systems with applications*, 38(8), 9407-9424.
- Cooper, R. G., Edgett, S. J., & Kleinschmidt, E. J. (1997). Portfolio Management in New Product Development: Lessons from the Leaders—II. *Research-Technology Management*, 40(6), 43-52. doi:10.1080/08956308.1997.11671170

- Cooper, R. G., Edgett, S. J., & Kleinschmidt, E. J. (2002). Portfolio management: fundamental to new product success. *The PDMA ToolBook 1 for New Product Development*, 472-472.
- Dai, C. X., & Wells, W. G. (2004). An exploration of project management office features and their relationship to project performance. *International Journal of Project Management*, 22(7), 523-532. doi:10.1016/J.IJPROMAN.2004.04.001
- Dane, F. C. (2011). *Evaluating research: Methodology for people who need to read research*: Sage.
- Danesh, D., Ryan, M. J., & Abbasi, A. (2015). Using analytic hierarchy process as a decision-making tool in project portfolio management. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, 9(12), 3770-3780.
- Darke, P., Shanks, G., & Broadbent, M. (1998). Successfully completing case study research: combining rigour, relevance and pragmatism. *Information systems journal*, 8(4), 273-289.
- Daymon, C., & Holloway, I. (2010). *Qualitative research methods in public relations and marketing communications*: Routledge.
- Dearden, J. (1969). CASE AGAINST ROI CONTROL. Retrieved from <https://www.sid.ir/En/Journal/ViewPaper.aspx?ID=303081>
- Dietrich, P., & Lehtonen, P. (2005). Successful management of strategic intentions through multiple projects – Reflections from empirical study. *International Journal of Project Management*, 23(5), 386-391. doi:10.1016/J.IJPROMAN.2005.03.002
- Drouin, N., & Jugdev, K. (2014). Standing on the shoulders of strategic management giants to advance organizational project management. *International Journal of Managing Projects in Business*.
- Dudin, M., & Frolova, E. (2015). The Balanced Scorecard as a Basis for Strategic Company Management in the Context of the World Economy Transformation. *Asian Social Science*, 11(3), 282-288.
- Eisenhardt, K. M. (1989). Making Fast Strategic Decisions In High-Velocity Environments. *Academy of Management Journal*, 32(3), 543-576. doi:10.5465/256434
- Elonen, S., & Arto, K. A. (2003). Problems in managing internal development projects in multi-project environments. *International Journal of Project Management*, 21(6), 395-402. doi:10.1016/S0263-7863(02)00097-2
- Epstein, M. J., & Manzoni, J. F. (2006). Performance measurement and management control: Improving organizations and society. Elsevier, 16, 355-377.
- Fiala, P. (2014). Strategic project portfolio management. *Strategic management journal*, 19(2), 007-013.
- Garfein, S. (2008). *Strategic Portfolio Management: The Key to the Executive Suite*: Project Management Institute.
- Ghapanchi, A. H., Tavana, M., Khakbaz, M. H., & Low, G. (2012). A methodology for selecting portfolios of projects with interactions and under uncertainty. *International Journal of Project Management*, 30(7), 791-803.
- Gutiérrez, E., & Magnusson, M. (2014). Dealing with legitimacy: A key challenge for Project Portfolio Management decision makers. *International Journal of Project Management*, 32(1), 30-39. doi:10.1016/J.IJPROMAN.2013.01.002
- Hassan, A. H. (2013, 2013). *A framework for strategy execution integrating the PMO and OCM*, New Orleans, LA.
- Hladchenko, M. (2015). Balanced Scorecard – a strategic management system of the higher education institution. *International Journal of Educational Management*, 29(2), 167-176. doi:10.1108/IJEM-11-2013-0164
- Iacob, M.-E., Quartel, D., & Jonkers, H. (2012, 2012/09/). *Capturing Business Strategy and Value in Enterprise Architecture to Support Portfolio Valuation*.
- Jarzabkowski, P., & Wilson, D. C. (2006). Actionable Strategy Knowledge:: A Practice Perspective. *European Management Journal*, 24(5), 348-367. doi:10.1016/J.EMJ.2006.05.009

- Jerbrant, A. (2014). A maturation model for project-based organisations - with uncertainty management as an ever-present multi-project management focus. *South African Journal of Economic and Management Sciences*, 17(1), 33-51.
- Johnson, L. K. (2004). Execute your strategy without killing it. *Harvard Management Update*, 9(12), 3-6.
- Jonas, D. (2010). Empowering project portfolio managers: How management involvement impacts project portfolio management performance. *International Journal of Project Management*, 28(8), 818-831. doi:10.1016/J.IJPROMAN.2010.07.002
- Jonas, D., Kock, A., & Gemünden, H. G. (2013). Predicting Project Portfolio Success by Measuring Management Quality Termination: An Empirical Study on Senior Management Involvement. Retrieved from
- Kaiser, M. G., El Arbi, F., & Ahlemann, F. (2015). Successful project portfolio management beyond project selection techniques: Understanding the role of structural alignment. *International Journal of Project Management*, 33(1), 126-139. doi:10.1016/J.IJPROMAN.2014.03.002
- Kaplan, R. S. (2005). The Balanced Scorecard: Measures that Drive Performance: *Harvard Business Review*.
- Kaplan, R. S. (2009). Conceptual Foundations of the Balanced Scorecard. *Handbooks of Management Accounting Research*, 3, 1253-1269. doi:10.1016/S1751-3243(07)03003-9
- Kaplan, R. S., & Norton, D. P. (1996). *The balanced scorecard : translating strategy into action*: Harvard Business Press.
- Kaplan, R. S., & Norton, D. P. (2000). Having trouble with your strategy? Then map it. *Harvard business review*, 49.
- Kaplan, R. S., & Norton, D. P. (2004). *Strategy maps : converting intangible assets into tangible outcomes*: Harvard Business School Press.
- Kaplan, R. S., & Norton, D. P. (2005). *Creating the office of strategy management*: Division of Research, Harvard Business School.
- Kaplan, R. S., & Norton, D. P. (2007). Using the balanced scorecard as a strategic management system. *Harvard business review*, 85(7/8), 150-150.
- Kasunic, M. (2010). Measurement and analysis infrastructure diagnostic, version 1.0: Method definition document. Retrieved from
- Kekic, L. (2007). The Economist Intelligence Unit's index of democracy. *The Economist*, 21, 1-11.
- Kendall, G. I., & Rollins, S. C. (2003). Advanced project portfolio management and the PMO : multiplying ROI at warp speed: J. Ross.
- Killen, C. P. (2014). Organizational Agility through Project Portfolio Management. *Portfolio Management: A Strategic Approach*, 17, 1-14.
- KPMG. (2017). Driving business performance. Retrieved from <https://home.kpmg/nz/en/home/insights/2017/04/project-management-survey-2017.html>
- Lawson, R., Stratton, W., & Hatch, T. (2003). The benefits of a scorecard system. *CMA management*, 77(4), 24-27.
- Lermack, H. (2003). *Steps to a basic company financial analysis*. Philadelphia University, Philadelphia, USA.
- Lerner, J. S., Li, Y., Valdesolo, P., & Kassam, K. S. (2015). Emotion and Decision Making. *Annual Review of Psychology*, 66(1), 799-823. doi:10.1146/annurev-psych-010213-115043
- Lueg, R., & Julner, P. (2014). How are Strategy Maps Linked to Strategic and Organizational Change? A Review of the Empirical Literature on the Balanced Scorecard. *Corporate Ownership & Control*, 11(4), 439-446.
- Majumder, M. (2015). Multi Criteria Decision Making. In (pp. 35-47): Springer, Singapore.

- Mankins, M. C., & Steele, R. (2005). Turning great strategy into great performance. *Harvard business review*, 83(7), 64-72.
- Marr, B. (2005). Business performance measurement: an overview of the current state of use in the USA. *Measuring Business Excellence*, 9(3).
- Marr, B., & Schiuma, G. (2003). Business performance measurement – past, present and future. *Management Decision*, 41(8), 680-687. doi:10.1108/00251740310496198
- Martello, M., Watson, J. G., & Fischer, M. J. (2016). Implementing A Balanced Scorecard In A Not-For-Profit Organization. *Journal of Business & Economics Research (JBER)*, 14(3), 61-61. doi:10.19030/jber.v14i3.9746
- Martinsuo, M., & Killen, C. P. (2014). Value management in project portfolios: Identifying and assessing strategic value. *Project Management Journal*, 45(5), 56-70.
- Martinsuo, M., Korhonen, T., & Laine, T. (2014). Identifying, framing and managing uncertainties in project portfolios. *International Journal of Project Management*, 32(5), 732-746.
- Meskendahl, S. (2010). The influence of business strategy on project portfolio management and its success — A conceptual framework. *International Journal of Project Management*, 28(8), 807-817. doi:10.1016/J.IJPROMAN.2010.06.007
- Mingming, H., Xiong, W., Shun, L., Yingliu, D., Qingquan, Y., & Quanfu, T. (2010, 2010/05//). Research on Performance Evaluation of Logistics Enterprises Based on the Balanced Scorecard. Paper presented at the International Conference on Intelligent Computation Technology and Automation.
- Moore, S. (2010). *Strategic project portfolio management : enabling a productive organization*: Wiley.
- Morris, P. W. G., & Jamieson, A. (2005). Moving from Corporate Strategy to Project Strategy. *Project Management Journal*, 36(4), 5-18. doi:10.1177/875697280503600402
- Näsholm, M. H., & Blomquist, T. (2015). Co-creation as a strategy for program management. *International Journal of Managing Projects in Business*, 8(1), 58-73.
- Needles, B. E., Shigaev, A., Powers, M., & Frigo, M. L. (2010). Strategy and integrated financial ratio performance measures: A longitudinal multi-country study of high performance companies. In (pp. 211-252): Emerald Group Publishing Limited.
- Niebecker, K., Eager, D., & Kubitzka, K. (2008). Improving cross-company project management performance with a collaborative project scorecard. *International Journal of Managing Projects in Business*, 1(3), 368-386.
- Niebecker, K., Eager, D., & Moulton, B. (2010). Collaborative and cross-company project management within the automotive industry using the Balanced Scorecard. *International Journal of Managing Projects in Business*, 3(2), 328-337.
- Örtengren, K. (2016). [A guide to Results-Based Management (RBM), efficient project planning with the aid of the Logical Framework Approach (LFA)].
- Pajares, J., & López, A. (2014). New Methodological Approaches to Project Portfolio Management: The Role of Interactions within Projects and Portfolios. *Procedia - Social and Behavioral Sciences*, 119, 645-652. doi:10.1016/J.SBSPRO.2014.03.072
- Parker, D. W., Parsons, N., & Isharyanto, F. (2015). Inclusion of strategic management theories to project management. *International Journal of Managing Projects in Business*, 8(3), 552-573.
- Patanakul, P. (2015). Key attributes of effectiveness in managing project portfolio. *International Journal of Project Management*, 33(5), 1084-1097. doi:10.1016/J.IJPROMAN.2015.01.004
- Petit, Y. (2012). Project portfolios in dynamic environments: Organizing for uncertainty. *International Journal of Project Management*, 30(5), 539-553. doi:10.1016/J.IJPROMAN.2011.11.007
- PMI. (2015). *Delivering on Strategy: The Power of Portfolio Management*. Retrieved from <https://www.pmi.org/learning/thought-leadership/series/portfolio-management/delivering-on-strategy>
- Pmsolutions. (2012). *Project Portfolio Management and the Strategic Project Office*. PM solutions. Retrieved from <http://www.pmsolutions.com/resources/view/what-is-the-project-management-maturity-model/>

- PMsolutions. (2013). The State of Project Portfolio Management (PPM). Retrieved from [https://www.pmsolutions.com/reports/State\\_of\\_PPM\\_2013\\_Research\\_Report.pdf](https://www.pmsolutions.com/reports/State_of_PPM_2013_Research_Report.pdf)
- Quezada, L. E., Cordova, F. M., Palominos, P., Godoy, K., & Ross, J. (2009). Method for identifying strategic objectives in strategy maps. *International Journal of Production Economics*, 122(1), 492-500.
- Ross, S., Westerfield, R., Jordan, B., Mazin, A., & Abidin, Z. F. (2007). *Financial management fundamentals in Malaysia*. McGraw-Hill.
- Saaty, T. L. (1980). *The Analytic Hierarchy Process: Planning, Priority Setting, Resources Allocation*. Resource Allocation. RWS Publications, USA.
- Salmimaa, T. (2018). Action-Structure Paradox in a Strategic Information System Change Process. 51st Hawaii International Conference on System Sciences.
- Scholey, C. (2005). Strategy maps: a step-by-step guide to measuring, managing and communicating the plan. *Journal of Business Strategy*, 26(3), 12-19.
- Scott, J. (2014). Putting Business Capabilities to Work. OMG Webinar, presentation conducted from Accelare.
- Singh, S., Olugu, E. U., Musa, S. N., & Mahat, A. B. (2018). Fuzzy-based sustainability evaluation method for manufacturing SMEs using balanced scorecard framework. *Journal of Intelligent Manufacturing*, 29(1), 1-18.
- Škrinjar, R., Bosilj-Vukšić, V., & Indihar-Štemberger, M. (2008). The impact of business process orientation on financial and non-financial performance. *Business Process Management Journal*, 14(5), 738-754.
- Striteska, M., & Spickova, M. (2012). Review and comparison of performance measurement systems. *Journal of Organizational Management Studies*, 2012, 1-1.
- Teller, J., Unger, B. N., Kock, A., & Gemünden, H. G. (2012). Formalization of project portfolio management: The moderating role of project portfolio complexity. *International Journal of Project Management*, 30(5), 596-607.
- Turner, J. R. (2009). *The handbook of project-based management : leading strategic change in organizations*. London, UK: McGraw-Hill.
- UNDP. (2007). Evaluation of Results Based Management at UNDP. Retrieved from <http://web.undp.org/evaluation/evaluations/thematic/rbm.shtml>
- Unger, B. N., Gemünden, H. G., & Aubry, M. (2012). The three roles of a project portfolio management office: Their impact on portfolio management execution and success. *International Journal of Project Management*, 30(5), 608-620. doi:10.1016/J.IJPROMAN.2012.01.015
- Vaidya, O. S., & Kumar, S. (2006). Analytic hierarchy process: An overview of applications. *European Journal of Operational Research*, 169(1), 1-29. doi:10.1016/J.EJOR.2004.04.028
- Vargas, R. V. (2010, 2010). Using the analytic hierarchy process (AHP) to select and prioritize projects in a portfolio. Paper presented at the In PMI global congress.
- Wadugodapitiya, R., Sandanayake, Y. G., & Thurairajah, N. (2010, 2010). Building project performance evaluation model. Paper presented at the In Proceedings of CIB 2010 World Congress, UK: The Lowry, Salford Quays.
- Ward, J. L. (2015). Chapter 4: Establishing A Governance Model for Strategic Portfolio Management. *Portfolio Management: A Strategic Approach*.
- Wessels, D. J. (2007). [The emergence of strategic project management].
- Wheelen, T. L., & Hunger, J. D. (2008). *Strategic management and business policy : concepts and cases*: Pearson/Prentice Hall.
- Yin, R. K. (2009). *Case study research: Design and methods fourth edition*. Los Angeles London: SAGE.

- Young, M., & Conboy, K. (2013). Contemporary project portfolio management: Reflections on the development of an Australian Competency Standard for Project Portfolio Management. *International Journal of Project Management*, 31(8), 1089-1100. doi:10.1016/J.IJPROMAN.2013.03.005
- Yu, L., Wang, S., Wen, F., & Lai, K. K. (2012). Genetic algorithm-based multi-criteria project portfolio selection. *Annals of Operations Research*, 197(1), 71-86. doi:10.1007/s10479-010-0819-6